

**Amendments to the Specification:**

**Please replace the paragraph beginning at page 6, line 11, with the following amended paragraph:**

-- Thallium atoms have such a simple electronic structure that only three energy states exist below energy of  $30,000 \text{ cm}^{-1}$ , such as the ground state ( $6^2P_{1/2}$ :  $0 \text{ cm}^{-1}$ ), metastable state ( $6^2P_{3/2}$ :  $7,793 \text{ cm}^{-1}$ ), and the excited state ( $7^2S_{1/2}$ :  $26,447.6 \text{ cm}^{-1}$ ). And thallium atoms have several advantages for efficient optical pumping. These are:

- (a) large electric dipole moment of the transition between  $6^2P_{1/2}$  and  $6^2S_{1/2}$
- (b) very short level lifetime of  $6^2S_{1/2}$  ( $7.5 \text{ nsec}$ )
- (c) branching ratio of the transition between  $6^2S_{1/2}$  and the metastable state is bigger than that of the transition between  $6^2S_{1/2}$  and the ground state.

Hence, very efficient pumping of thallium atoms into the metastable state can be easily achieved if a CW laser frequency (about  $378 \text{ nm}$  in the wavelength) is resonant to the transition line of  $6^2P_{1/2}$  and  $6^2S_{1/2}$ . Because the metastable state population of thallium atoms is lower than  $10^{-3}$  when thallium is heated at temperature to generate an atomic beam, their initial population does not affect the isotope selectivity at this temperature range. --